

FIRE DEPARTMENT • CITY OF NEW YORK



**STUDY MATERIAL FOR THE
CERTIFICATE OF FITNESS EXAMINATION
F-40
OPERATOR OF CENTRAL STATION SIGNALING
SYSTEMS**

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NOTICE OF EXAMINATION

Title: **Examination for Certificate of Fitness for Operator of Central Station Signaling Systems (F-40)**

Date of Exam: Written exams are conducted Monday through Friday (except legal holidays) 8:00 AM to 2:30 PM.

F-40 can be obtained by passing a written exam or qualifying for an exemption on the basis of education and experience.

REQUIREMENTS FOR WRITTEN EXAM FOR F-40

Applicants who need to take the exam must apply in person and bring the following documents:

1. Applicants must be at least 18 years of age.
2. Applicants must have a reasonable understanding of the English language.
3. Applicant must provide two forms of identifications; at least one identification must be government issued photo identification, such as a State-issued Driver's License or Non Drivers License or a passport.
4. Applicants must present a letter of recommendation from his/her employer.

The employer must be an FDNY approved Central Station Company.

The letter must be on official letterhead, and must state the applicant's full name, experience and the address where the applicant will work. If the applicants are self-employed or the principal of the company, they must submit a notarized letter attesting to their qualifications. For more info:

http://www.nyc.gov/html/fdny/html/c_of_f/cof_requirements.shtml .

5. Applicants must present a completed application for certificate of fitness (A-20 Form). <http://www.nyc.gov/html/fdny/pdf/a20.pdf>
6. Applicants not currently employed may take the exam without the recommendation letter. If the applicants pass the exam, FDNY will issue a temporary letter with picture for the job seeking purpose. The C of F card will not be issued unless the applicants are employed and provide the recommendation letter from his/her employer.

7. **APPLICATION FEES:**

The **\$25** application fee for the exam can be paid by one of the following methods:

- Cash
- Credit card (*American Express, Discover, MasterCard, or Visa*)
- Debit card (*MasterCard or Visa*)
- Personal or company check or money order (*made payable to the New York City Fire Department*)

For fee waivers submit: ***(Only government employees who will use their C of F for their work- related responsibilities are eligible for fee waivers.)***

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises;
AND

- Copy of identification card issued by the agency
- A convenience fee of 2.49% will be applied to all credit card payments.

8. EXAM INFORMATION

The **F-40** exam will consist of **25** multiple-choice questions, administered on a “touch screen” computer monitor. It is a time-limit exam. A passing score of at least 70% is required in order to secure a Certificate of Fitness. Call (718) 999-1988 for additional information and forms.

Please always check for the latest revised booklet at FDNY website before you take the exam.

http://www.nyc.gov/html/fdny/pdf/cof_study_material/f_40_st_mat.pdf

9. If all the requirements are met and pass the exam a certificate will be issued the same day. Applicant who fails the exam will receive a failure report. To retake the exam applicants will need to submit a new application and payment.

ALTERNATIVE ISSUANCE PROCEDURE (AIP)

This certificate of fitness can be obtained by qualifying for an exemption from a exam on the basis of education and experience. Applicants who qualify for AIP must apply online. For more detail information applicants must review the **F-40** AIP information. http://www.nyc.gov/html/fdny/pdf/cof_study_material/f40_aip_info.pdf

RENEWAL REQUIREMENTS

This Certificate of Fitness must be renewed every **THREE YEARS**. The renewal fee is **\$15**. FDNY also reserves the right to require the applicants to take a re-examination upon submission of renewal applications.

You will receive a courtesy notice of renewal 90 days before the expiration date. However, it is your responsibility to renew your Certificate. It is very important to renew your C of F before it expires. Renewals submitted 90 days (up to one year) after the expiration date will incur a \$25 penalty in addition to the renewal fee. Certificates expired over one year past expiration date will not be renewed. New exams will be required.

To change a mailing address:

- Submit a letter requesting the change of mailing address and a copy of your C of F with \$5.00 fee.

To change a work location,

- Submit a letter from your current employer (on company letterhead) confirming that you are an employee and stating your new work location with a copy of your C of F and a \$5.00 fee

To request a replacement certificate:

- Submit a driver's license or passport, social security number, mailing address and a \$5.00 fee.

The certificate can be renewed **On-line, by Mail or in Person.**

- **Renewal online**

If you are an individual, make sure you have your 12 digit Certificate of Fitness Access ID. This can be found on your Renewal Notice. If you do not have your Renewal Notice, your Access ID is your 8 digit Certificate of Fitness number and the last four digits of your social security number. If you are submitting renewals on behalf of a company's employees, the company must be approved by FDNY and have an 8 digit Company Code. To request approval, email pubrenew@fdny.nyc.gov.

Renewal fee can be paid by one of the following methods:

- Credit card (American Express, Discover, MasterCard, or Visa)
- Debit card (MasterCard or Visa)
- E-check

A fee exempted applicants cannot renew online only by mail or in person.

If all the requirements are met, the certificate of fitness will be mailed out within 10 days.

For online renewal go to: <https://paydirect.link2gov.com/FDNYCOF/ItemSearch>

- **Renewal by mail**

Mail your Renewal Notice (if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment

Personal or company check or money order (made payable to the New York City Fire Department)

For fee waivers submit: ***(Only government employees who will use their C of F for their work- related responsibilities are eligible for fee waivers.)***

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; **AND**
- Copy of identification card issued by the agency

and if applicable, supporting documents to:

NYC Fire Department (FDNY)

Cashier's Unit

9 MetroTech Center, 1st Floor

Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be mailed out within four to six weeks.

- **Renewal in person**

Submit your Renewal Notice (or if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment by one of the following methods:

- Cash
- Credit card (*American Express, Discover, MasterCard, or Visa*)

- Debit card (*MasterCard or Visa*)
- Personal or company check or money order (*made payable to the New York City Fire Department*)

For fee waivers submit: **(Only government employees who will use their C of F for their work- related responsibilities are eligible for fee waivers.)**

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; **AND**
- Copy of identification card issued by the agency

and if applicable, your supporting documents to:

NYC Fire Department (FDNY)

Cashier's Unit

9 MetroTech Center, 1st Floor

Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be issued the same day.

A convenience fee of 2.49% will be applied to all credit card payments for original or renewal certificates.

EXAM SITE: **FDNY Headquarters, 9 MetroTech Center, Brooklyn, NY.** Enter through the **Flatbush Avenue entrance (between Myrtle Avenue and Tech Center Center**



STUDY MATERIAL AND EXAM DESCRIPTION

About the Study Material

This study material will help you prepare for the examination for the Certificate of Fitness for operators of central station signaling systems. The study material includes information taken from the New York City Fire Code. The exam covers the entire booklet and any tables. **It will not be provided to you during the test. It is critical that you read and understand this booklet to help increase your chance of passing this exam.** The study material does not contain all of the information you need to know to work as a central station operator. It is your responsibility to become familiar with all applicable rules and regulations of the City of New York, even if they are not covered in this study material. In order to adequately prepare for the exam, you need to be familiar with the Fire Code Section 901 and 907, Fire Rule Section 901-01 and the NFPA 72 Chapter 8 (2002 Ed.) which regulate the duties of for the central station operators.

About the Test

Twenty-Five **(25)** questions on the Certificate of Fitness examination are of the multiple choice type with 4 alternative answers to each question. Only one answer is most correct for each question. If you do not answer a question or if you mark more than one alternative your answer will be scored as incorrect. A score of 70% is required on the examination in order to qualify for the Certificate of Fitness. Read each question carefully before marking your answer. There is no penalty for guessing.

Sample Questions

1. Which of the following are allowed to be used/displayed while taking a Certificate of Fitness examination at 9 Metro Tech Center?

- I. cellular phone**
- II. study material booklet**
- III. reference material provided by the FDNY**
- IV. mp3 player**

- A. III only
- B. I, II, and III
- C. II and IV
- D. I only

Only reference material provided by the FDNY is allowed to be used during Certificate of Fitness examinations. Therefore, the correct answer would be
A. You would touch “A” on the computer terminal screen.

2. If you do not know the answer to a question while taking an examination, who should you ask for help?

- A. the person next to you
- B. the firefighters
- C. the examiner in the testing room
- D. you should not ask about test questions since FDNY staff cannot assist applicants

You should not ask about examination questions or answers since FDNY staff cannot assist applicants with their tests. Therefore, the correct answer would be D. You would touch "D" on the computer terminal screen.

3. If the screen on your computer terminal freezes during your examination, who should you ask for help?

- A. the person next to you
- B. the firefighters
- C. the examiner in the testing room
- D. the computer help desk

If you have a computer related question, you should ask the examiner in the testing room. Therefore, the correct answer would be C. You would touch "C" on the computer terminal screen.

INTRODUCTION

An FDNY approved central station company is a monitoring facility that receives alarm signals from a protected premises and retransmits, or otherwise reports, the alarm signals to the Fire Department. A central station company may also provide watchman and supervisory services. A central station company shall obtain a certificate of operation from the FDNY and shall be listed by a Nationally Recognized Testing Laboratory acceptable to the FDNY. It shall be unlawful for any person to operate a central station that monitors fire alarm systems and maintain transmitters in protected premises without a certificate of operation from the FDNY. A copy of this certificate of operation shall be **posted** at each central station.

Certificate of Fitness Requirements

All FDNY approved central station companies shall have sufficient qualified operators on duty at all times to ensure immediate attention to all signals received. This shall include a minimum of 2 operators on duty at each central station at all times, each of whom shall possess an F-40 Certificate of Fitness (C of F) to operate central station equipment. Certificate of Fitness holders must maintain all qualifications and comply with all requirements applicable to such certificate holders throughout the term of each certificate. The F-40 Certificate of Fitness is premises-related. F-40 C of F holders shall be trained and fully capable of operating the central station equipment in the central station that they are employed. An F-40 C of F applicant must provide the address of his/her place of employment to the FDNY as one of the qualifications to take the examination.

F-40 Certificates of Fitness are valid for a period not to exceed three years from the date of issuance. At the end of this period, the certificate expires unless the Fire Commissioner approves its renewal. Please be advised that certificate renewals shall be at the discretion of the Fire Commissioner in the interest of public safety.

A trainee functioning as an operator must work under the direct supervision and in the presence of an operator holding an F-40 Certificate of Fitness, and may not be counted as one of the 2 qualified operators.

Central station operators shall monitor and process all fire alarm signals before any other signals, regardless of the order in which they are received. When they receive fire alarm signals, these C of F F-40 holders shall retransmit those signals immediately to the Fire Department. A signal is deemed to be received at the time it is processed by the automation software. The operator shall also notify the protected premises after re-transmitted the signal to the Fire Department.

Alarm signals transmitted to the Fire Department shall indicate the type of alarm received (e.g., automatic, valve, manual or carbon monoxide). **Any fire alarm signal must be treated as a real alarm signal even if it is automatically restored by the fire alarm system of the premises. The signal must be re-transmitted to the Fire Department.**

The Certificate of Fitness holder must keep the F-40 Certificate of Fitness upon his or her person, or otherwise readily available at all times for inspection by any representative of the Fire Department, while operating or supervising central station equipment.

Certificate of Fitness holders should be aware that they may be required to demonstrate their knowledge and proficiency of their duties related to their certificates. This includes the time of original and renewal application, as well as when Fire Department representatives conduct central station inspections. The Fire Department can deny, suspend, revoke or refuse to renew a certificate for misconduct. This would include the failure of the certificate holder to properly fulfill his or her duties for any reason.

In addition to any other penalties provided by law, misconduct on the part of an applicant or holder of a Certificate of Fitness shall be grounds for denial, non-renewal, suspension or revocation of a certificate, and denial of an application for a certificate or the opportunity to take a certificate examination. Such misconduct includes, but is not limited to:

- the failure of certificate holders to properly fulfill their duties
- any false and fraudulent conduct in connection with an application for a certificate or the duties of a certificate holder, including:
 - false or fraudulent statements or submissions
 - unauthorized changes to, or use of, a certificate or possession of a fraudulent certificate
 - cheating on an examination
 - impersonating another person or allowing oneself to be impersonated
- the failure to promptly notify the Fire Department of any change in the applicant's or certificate holder's residential or work address.
- any other conduct that may be evidence or be reasonably understood as diminishing the integrity or reliability of an applicant or certificate holder
- compromising the integrity or confidentiality of a Fire Department examination

The F-40 holder must be familiar of their obligations for notifying the Fire Department in the event of fire. Further information is available at:

- Emergency Planning and Preparedness: **[FC Chapter 4 Section 401.3 and Section 408]**
- Fire Protection System: **[FC Chapter 9 Section 901 and Section 906]**
- Central Station Monitoring of Fire Alarm Systems: **[Fire Rule Section 901-01]**

DEFINITIONS

ALARM SERVICE. The service provided by a central station company commencing upon the transmission from the protected premises of an alarm signal, a supervisory signal, or a trouble signal.

APPROVED CENTRAL STATION COMPANY. A central station company that has been issued a valid certificate of operation.

CENTRAL STATION. A facility that receives alarm signals from a protected premises and retransmits or otherwise reports such alarm signals to the department.

CENTRAL STATION SIGNALING SYSTEM. A system comprised of the protective signaling system at the protected premises, the central station physical plant, the exterior communications channels, and satellite stations, if any.

CERTIFICATE OF OPERATION. A written statement issued by the commissioner approving the operation of a central station, for which such certificate is required by this code or the rules, or the construction codes.

DEFINED FIRE ALARM SYSTEM. A fire alarm system or any sub-system thereof that automatically transmits signals to the department or a central station and that is installed in premises which are required to have a fire alarm system.

DESIGNATED REPRESENTATIVE. A person or entity designated by the subscriber who shall be responsible for receiving notifications from the central station company concerning the status of the protective signaling system at the protected premises and who is authorized to take action with respect to such system.

HIGH-RISE BUILDINGS. Based on 2008 NYC Building Code, the term of “high-rise buildings” applies to buildings having occupied floors located more than 75 feet above the lowest level of fire department vehicle access. These buildings shall be provided with an automatic fire alarm system and an emergency voice/alarm communication system.

Exceptions:

1. Buildings occupied entirely by Group R-3 classification.
2. Open parking garages in accordance with BC 406.3.
3. Buildings with an occupancy in Group A-5 in accordance with BC 303.1.
4. Low-hazard special industrial occupancies in accordance with BC 503.1.2

5. Building with an occupancy in Group H-1, H-2 or H-3 in accordance with BC 415.

MANDATORY SYSTEM. A protective signaling system whose installation at a protected premises is required by law.

PRESIGNAL SYSTEM. A fire alarm system having a feature that allows initial fire alarm signals to sound in a constantly attended central location and for which a human action is subsequently required to achieve a general alarm, or a feature that allows the control equipment to delay the general alarm by more than one minute after the start of the alarm processing.

PROTECTED PREMISES. A building, occupancy or structure located in the city that is equipped with a fire alarm system that transmits an alarm signal to the department or a central station that monitors such system for the purposes of reporting fire alarms to the department, whether or not the installation of such system on the premises is required by law.

PROTECTIVE SIGNALING SYSTEM. A system or device installed at a protected premises and designed to transmit an alarm signal, a supervisory signal or a trouble signal.

RUNNER SERVICE. The dispatching to the protected premises of individuals designated by a central station company, other than the required number of operators on duty to monitor signals, to silence, reset and otherwise restore the protected signaling system to normal service. Such runners may be employees of the central station company, another approved central station company, or a service retained by the central station company, provided that the individuals are trained in and knowledgeable of the protective signaling systems for which they are providing runner service.

SUBSCRIBER. An owner of a protected premises, or an owner of a fire alarm system installed on such a premises, who has arranged for a central station company to monitor the fire alarm system on the protected premises for the purpose of reporting fire alarms to the Fire Department.

TERMINAL. A number assigned by the Fire Department which indicates a specific location and/or type of alarm signal at a protected premises.

TRANSMITTER. A component of a protective signaling system that provides the link between a fire alarm system and the transmission channels.

VOLUNTARY SYSTEM. A protective signaling system whose installation at a protected premises is not required by law.

CORE BUILDING SYSTEM. Fire alarm system devices and equipment in and around the central or main building stairwells, elevators and utility risers of any buildings, except buildings classified in Occupancy Group R-3. A fire alarm system includes the fire command center (commonly referred to as a fire command station), fire pump, main sprinkler water flow switch, main sprinkler valve tamper switch, elevator lobby smoke detectors, central station connections, elevator in readiness operation, and core alarm boxes, warden phones and other fire alarm communications devices. Such fire alarm systems are also commonly referred to as the “base” building system.

PROPRIETARY CENTRAL STATION. A central station operated by or on behalf of the owner of the protected premises monitored by the central station, that monitors protected premises other than the premises in which the central station is located. For purposes of this section and R4604-01, unless otherwise specifically provided, reference to “central station company” shall be deemed to include proprietary central stations.

1. REQUIREMENTS FOR CENTRAL STATION

Central Station is one of the general types of supervising station that have initiating device circuits that provide a means of interconnect the fire alarm control panel. It can receive or retransmit alarm signals from a protected premises and provide property protection by summoning the Fire Department.

1.1 General Requirements for Central Stations

The central station operating room **shall be locked** at all times and access restricted to authorized persons only. Emergency power shall be provided for the exclusive use of the operating room and other areas vital to the continuous operation of the central station and its provision of fire alarm monitoring services. The emergency power supply shall function automatically upon failure of the normal power supply system.

The central station shall be equipped with devices, equipment and systems capable of automatically receiving and recording signals. Such devices, equipment and systems shall be listed by Factory Mutual, Underwriters Laboratories or other approved nationally recognized testing laboratory. Circuit adjusting instruments or equipment for emergency operations may be automatically initiated or manually operated upon receipt of a trouble signal.

The retransmission of an alarm signal received at the Fire Department shall be effected as follows:

(A) by the use of **2 telephone lines** provided with suitable voice transmitting, receiving and automatic recording equipment, provided that these lines shall not be used for any purpose except communication between the Fire Department and the central station and shall have terminal equipment located at the central station and the Department and shall be provided with twenty-four hour standby power; or

(B) any other means of retransmission deemed by the Fire Department to effect a retransmission at a level of reliability.

The company shall maintain at each central station **at least one cellular telephone available** for communication with the Fire Department and the protected premises in the event that telephone circuitry is inoperable.

The Borough Communication Office phone numbers are listed on the following page. These numbers must be posted at all dispatch stations that retransmit fire alarm signals to the FDNY. Furthermore, these numbers must be programmed into the cellular phone. If the primary or secondary lines fail, the cellular telephone should be utilized to transmit the signal.

Manhattan properties (212) 999-2222
Bronx properties (718) 999-3333
Brooklyn properties (718) 999-4444
Queens properties (718) 999-5555
Staten Island properties (718) 999-6666

1.2 Runner Service.

A central station company shall ensure that a fire alarm system requiring manual silencing or resetting is restored to normal service no later than 120 minutes from receipt of an alarm signal. The central station company shall dispatch a runner to the protected premises for such purpose and shall immediately notify the Fire Department once the system has been restored. A runner need not be dispatched and may be recalled if the central station confirms that the fire alarm system has already been restored, in which case the central station company shall immediately notify the Fire Department.

1.3 Daily Test.

A central station company shall test all paths of communication for the central station signaling system that are not supervised **at least once every twelve hours**. A record of such tests shall be maintained in the central station log. The operator shall follow adequate procedures for notification, and advise the contact of a “communication failure” if he/she has NOT received a daily “test” signal from a fire alarm panel after business hours.

2. GENERAL KNOWLEDGE OF FIRE ALARM SYSTEMS

Fire alarm systems are required in many locations as part of a fire protection system. Fire alarm systems are required in various types of occupancies. Some examples of such occupancies are hotels, shelters, hospitals, office buildings and mercantile occupancies. If a fire emergency occurs the alarm system notifies the occupants of the building. Gongs, bells, horns, and speakers are used to signal when there is a fire. Some fire alarm systems also use flashing lights. Gongs, bells, horns, speakers and flashing lights are commonly called notification appliances.

2.1 Fire Alarm Control Panel

FACP is a system component that monitors inputs and control outputs through various circuits. Its primary purpose of the fire alarm control panel is to process signals received from initiating devices and to activate appropriate signals and outputs.



Fire alarm control panel (FACP)

All signals are transmitted to the supervising central station. Trained operators receive and interpret the signals and take necessary action. The central station operators transmit fire alarms to the FDNY Bureau of Fire Communication's dispatch center.

Three types of signals initiated by FACP:

A. Fire Alarm Signal: A signal initiated by a fire alarm initiating device such as a manual fire alarm pull station, automatic fire detector, water flow switch, or other device in which activation is indicative of the presence of a fire or fire signature. When a fire signal is generated, the FACP activates the building audible and visual devices connected to the fire alarm (i.e. horn/strobes), sends a signal to an FDNY approved central station, and actuates control of certain building functions.

Central station operators shall monitor and process all fire alarm signals before any other signals, regardless of the order in which they are received. When they receive fire alarm signals, operators at the central station retransmit those signals to the Fire Department.

Alarm signals shall be re-transmitted to the Fire Department immediately upon receipt of the signal at the central station. A signal is deemed to be received at the time it is processed by the automation software. The operator shall also notify the premises after retransmitting the signal to the Fire Department. Alarm signals transmitted to the Fire Department shall indicate the type of alarm received (e.g., automatic, valve, manual or carbon monoxide). **EVERY fire alarm signal must be re-transmitted immediately to the FDNY as a fire alarm signal even if it is automatically restored by the premise fire alarm system. There are NO EXCEPTIONS.**

B. Trouble Signals: Fire Alarm Control Panels are provided with means to detect and signal trouble conditions. Trouble signals indicate that the alarm system, transmitter, or communications path is wholly or partially out of service. Common trouble conditions monitored by a Fire Alarm Control Panel are battery condition, AC failure, ground fault, open or short circuit on a wire, phone line failure, or internal component failure.

Upon receipt of trouble signals or other signals pertaining solely to equipment maintenance of an alarm system, the central station shall communicate immediately with persons designated by the subscriber. Routine handling should take a maximum of four minutes from receipt of a trouble signal by the central station until initiation of the investigation by telephone.

A Central Station will occasionally experience unusual circumstances resulting in an inordinate amount of trouble signals received simultaneously such as a power failure encompassing a large area.

A trouble signal will ordinarily annunciate audibly and visually at the Fire Alarm Control Panel to indicate the trouble condition needs to be investigated and corrected.

Note: The FDNY is not dispatched to respond to trouble signals. Trouble signals are not indicative of a fire condition.

C. Supervisory Signals:

A signal that results from detection of a supervisory condition-(indicative of a device or system in an abnormal state).

Supervisory signals are generated from initiating devices such as:

1. Valve supervisory switch on a sprinkler system
2. High/Low water level switch on a gravity tank feeding a sprinkler system
3. Low air pressure switch from a dry pipe sprinkler system
4. Fire pump running/pump failure/pump phase reversal



Pressure tank

WATER-FLOW ALARMS AND SPRINKLER SYSTEM SUPERVISION

Sprinkler systems should have devices and equipment for signaling when water flows through risers or mains supplying the systems. The flow may be because of fire, leakage, or accidental rupture of the piping. It is important that prompt action is taken when waterflow is signaled by these devices.

Functions of Alarms and Supervisory Signals - A sprinkler system with a water flow alarm serves two functions: 1) It is an effective fire extinguishing system, and 2) It is an automatic fire alarm. An alarm is signaled as soon as a sprinkler head has opened. This is important since it allows the occupants' time to leave the building. It also signals that the Fire Department should be summoned.

Waterflow alarms and fire alarms give warning of the actual occurrence of a fire. They also signal when water flows through the system because of broken pipes. Alarms alert occupants and summon the Fire Department. Any signal, whether waterflow or supervisory, may be used to sound an audible local sprinkler alarm. It may also send a signal to the central station company. The central station company will then contact the local fire house.

Supervisory devices are often connected to an approved central station company which monitors the sprinkler system for problems with equipment and when sprinkler heads are opened. The central station company should be notified when any control valves are closed for maintenance or repair. This reduces the number of false alarms.

Devices and Equipment Supervised. Sprinkler system supervision is commonly provided for several purposes. It is used to supervise 1) water supply control valves, 2) low water level in water supply tanks, 3) low temperature in water supply tanks or ground level reservoirs, 4) high or low water level in pressure tanks, 5) high or low air pressure in pressure tanks, 6) high or low air pressure in dry pipe sprinkler systems, 7) failure of electric power supply to fire pumps and, 8) automatic operation of electric fire pumps.

Waterflow Alarm Valves - The basic design of most water-flow alarm valves is that of a check valve which lifts from its seat when water flows into a sprinkler system. This alarm then starts an audible signal to alert the occupants in the building that the sprinkler system has been activated.

Vane type waterflow - Switches have a paddle inserted inside the main supply piping perpendicular to the direction of flow. Upon waterflow, the paddle switch transmits an alarm. Vane type waterflow switches cannot be installed to monitor waterflow in dry pipe sprinkler systems.



Fire pump

A **fire pump** is a part of a fire sprinkler system's water supply and can be powered by electric, diesel or steam. The pump intake is either connected to the public underground water supply piping, or a static water source (e.g., tank, reservoir, lake). The pump provides water flow at a higher pressure to the sprinkler system risers and hose standpipes.

The fire pump starts when the pressure in the fire sprinkler system drops below a threshold. The sprinkler system pressure drops significantly when one or more fire sprinklers are exposed to heat above their design temperature, and opens, releasing water.

Fire pumps are needed when the local municipal water system cannot provide sufficient pressure to meet the hydraulic design requirements of the fire sprinkler system. This usually occurs if the building is very tall, such as in high-rise buildings, or in systems that require a relatively high terminal pressure at the fire sprinkler in order to provide a large volume of water, such as in storage warehouses. Fire pumps are also needed if fire protection water supply is provided from a ground level water storage tank.

Fire pump controllers are control panels containing electrical components such as circuit breaker, switches, relays and other devices dedicated to the operation of fire pumps. The devices within a fire pump controller panel perform such functions as receiving signals from alarm devices, such as pressure operated switches, sprinkler alarm valves or remote fire alarm equipment; activating motor control devices to provide electric power to motors driving fire pumps and monitoring the fire pump operation.

A "Pump Running" signal is sent to the central station when the fire pump has been activated.

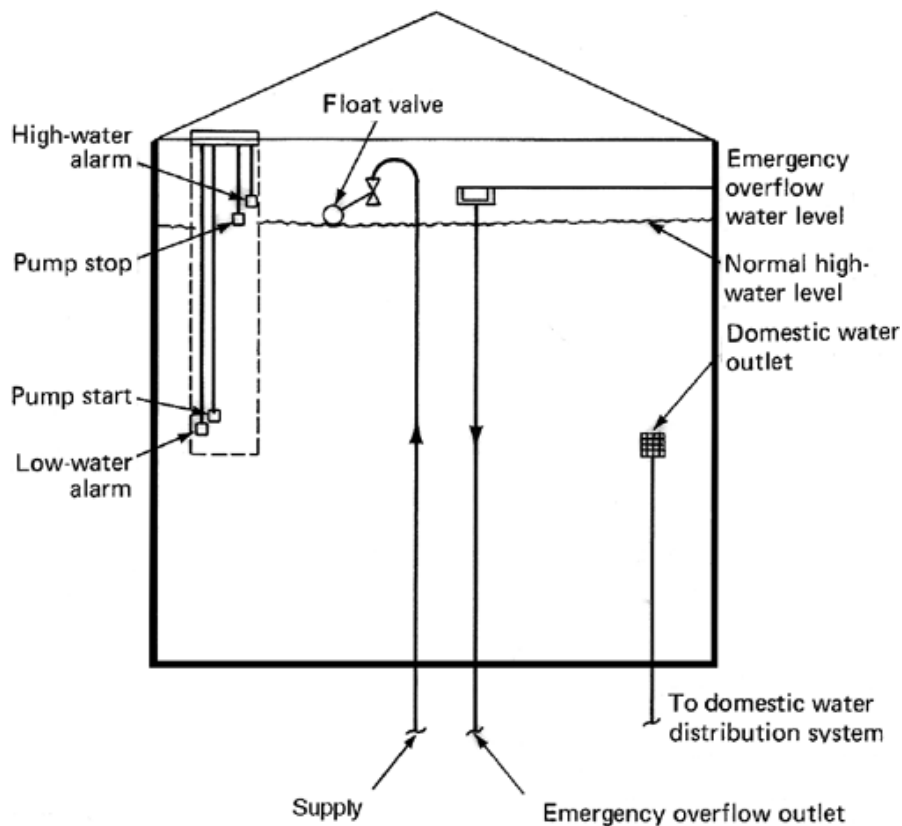
A "Pump Fail" signal is sent to the central station if the pump fails to activate properly.

A "Phase Reversal" signal is sent to the central station when the motor reverses its direction of rotation. Phase reversal can cause serious injury and motor damage.

Gravity tanks are used for water storage and are installed on the roof of a building. They are made of wood, steel or concrete. A gravity tank is used as a primary or secondary water supply source for a sprinkler system. A gravity tank system delivers water from the tank into the sprinkler system when a sprinkler head activates. Because this system does not rely on pumps, it is very reliable, but the tank must be supervised by an approved central station.

A central station would supervise signals from the tank including water level and temperature. An example of a typical gravity tank is shown on the following page.





Gravity Tank

Supervisory signals may indicate that something or someone has impaired a vital protection system, so the central station must handle supervisory signals promptly and accurately.

Upon receipt of a supervisory signal from a sprinkler system, fire suppression system, or other equipment, a central station shall communicate immediately with the persons designated by the subscriber. Handling of supervisory signals should take a maximum of four minutes from receipt of a supervisory signal by the central station until initiation of the investigation by telephone.

A supervisory signal will ordinarily annunciate audibly and visually at the fire alarm control panel to indicate the supervisory condition needed to be investigated and corrected.

2.2 Manual Fire Alarm Boxes (also referred to as pull stations)

Fire alarm systems that are manually activated use fire alarm pull stations. Manual fire alarm boxes shall be located near the exits throughout the protected area so that they are conspicuous, unobstructed, and accessible.



Manual fire alarm boxes

The alarm stations used to activate the fire alarm system are called initiating devices. Once a manual pull station is activated, that device must be reset prior to resetting at the main Fire Alarm Control Panel (FACP). **The fire alarm control panel shall only be reset at the direction of a Fire Department representative.**



2.3 Automatically Activated Fire Alarms

An automatic fire alarm system is a system which sounds a signal when a fire detection device indicates that there is a fire.

An automatic fire detector is an initiating device which detects the presence of a fire condition and initiates action. This includes the detection of the presence of smoke/and or heat.

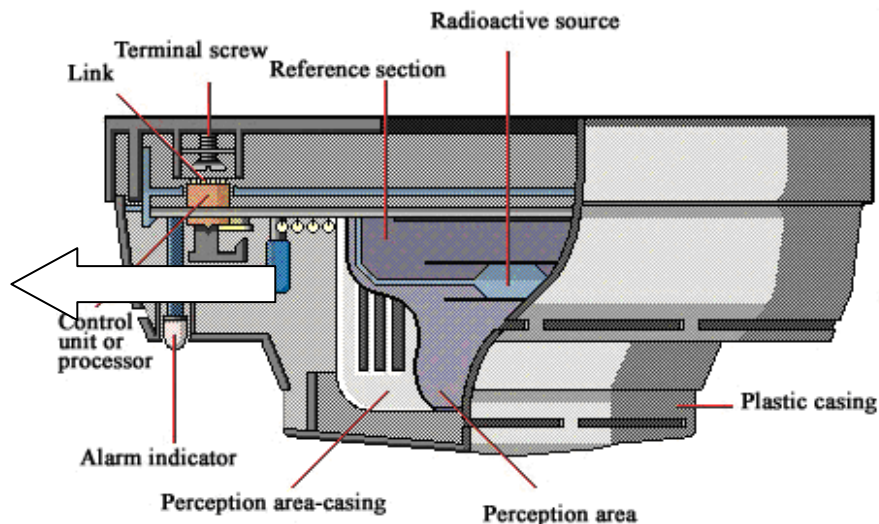
2.3.1 Common automatic fire detectors

(1) Smoke detector

It is important to understand how smoke detectors operate for two reasons. The first reason is to allow the detector to activate in the earliest amount of time. Smoke detectors are used where early warning is necessary to give occupants more time to safely exit a building. Another reason is to reduce nuisance alarms caused by environmental conditions or occupant activities.

Smoke detectors can provide early warning of a fire, providing for immediate evacuation of occupants. Smoke detectors detect fires more rapidly than heat detectors by sensing smoke particles. The smoke particles may or may not be visible to the human eye.

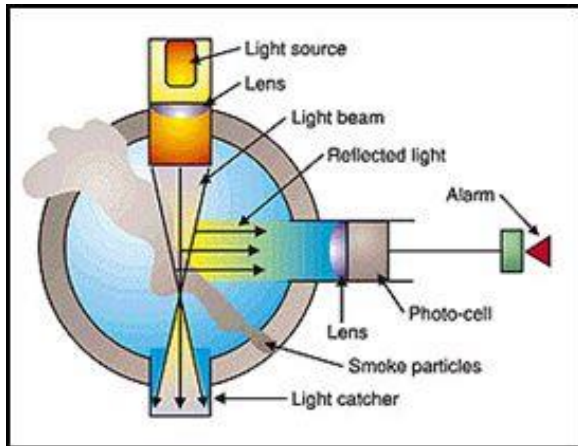
There are basically three types of smoke detectors: ionization, photoelectric and air sampling.



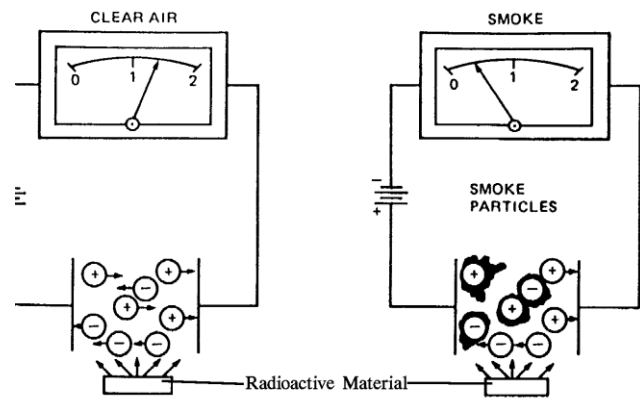
**Anatomy of a
typical Smoke
Detector**

An **ionization detector** uses a very small amount of a radioactive material to ionize air between two charged plates, causing a current flow. When smoke enters the ionization chamber, the smoke is attracted to the ionized particles and that will reduce the current flow. Once the current drops to a pre-determined level, the detector will alarm. Some sources of potential problems for ionization detectors are excessive air velocity or gusts of wind, most types of fumes and vapors, such as cooking fumes, engine exhaust and chemical fumes.

Photoelectric detectors come in two types: area or spot-type, and projected beam smoke detectors. Spot-type detectors are often referred to as light-scattering smoke detectors because there is a light source in the chamber that shines into the detection chamber. If there is smoke (or steam, dust or insects) in the chamber, the light will reflect onto a photosensitive sensor, causing an alarm. To reduce nuisance alarms, care must be taken to avoid using photoelectric smoke detectors in steamy or dirty environments.



Photoelectric Detector Principle



Ionization Detector Principle

Projected beam-type detectors are used in applications where it is not practical to use spot-type detectors. Common applications include use in high ceiling areas such as atriums, warehouses, stadiums, and gymnasiums.



Projected beam-type detectors



Duct smoke detectors

Duct smoke detectors are used to help prevent smoke from spreading from the fire area to other parts of the building by shutting down the HVAC system. They also may be used to help protect the air handling equipment by shutting down the system if the fan or filter should start burning. When used with smoke control systems to re-direct the airflows in the building, they control smoke dampers in the ductwork, thus changing the direction of airflow, instead of shutting down the HVAC units.

Air sampling smoke detectors are very early warning detectors used in data processing centers or similar environments. These operate by having a piping network with sampling ports installed in the area to be protected. Air is drawn through this piping network back into the detection chamber where a laser typically is used to look for a certain number of smoke particles in a given

amount of time. These detectors can be set up to be very sensitive and are often used as a first warning of a potential problem.

Multi-Criteria Detector a initiating device that contains multiple sensors that separately respond to physical stimulus such as heat, smoke, or fire gases, or employs more than one sensor to sense the same stimulus. This sensor is capable of generating only one alarm signal from the sensors employed in the design either independently or in combination.

Combination Detector a device that either responds to more than one of the fire conditions or employs more than one operating principle to sense one of these conditions. Typical examples are a combination of a heat detector with a smoke detector or a combination rate-of-rise and fixed-temperature heat detector. Normally, a "Combination Detector" provides a single response from either sensing method, each of which operates independent of the other. This device has listings for each sensing method employed.

(2) Heat detector



A sensor that detects abnormally high temperature or rate of temperature rise. Heat detectors have been shown to be very effective in reducing fire damage. (example pictured on the left) Heat detector is an example of a automatic type signal device.

Heat detectors are available in two general types: **rate-of-rise and fixed temperature.**

The rate-of-rise heat detectors activate the alarm when the room temperature increases at a rapid rate. This type of detector is more sensitive than the fixed temperature detector. The rate-of-rise heat detector does not have to be replaced after it has activated the fire alarm.



Rate-of- rise heat detector

The fixed-temperature heat detectors activate the alarm when the detector components melt at a preset temperature level. The fixed-temperature heat detectors normally require replacement after they have sounded an alarm; however, intelligent heat detectors will usually reset themselves.



Fixed- temperature heat detectors

2.4 Carbon Monoxide Detectors

Carbon monoxide detectors are required in any building that has fossil (gas and oil) fuel burning equipment.



Carbon monoxide detector

A carbon monoxide detector is a device indicating a concentration of carbon monoxide at or above the alarm threshold that could pose a risk to the life safety of the occupants and that requires immediate action.

2.5 Waterflow initiating devices (Valves)

Waterflow alarms are designed to signal when water flows through the fire protection system. For example, a waterflow indicator signals when water flows through the piping in a sprinkler system. Waterflow in the sprinkler system may be detected using one of two methods. These methods use vane type waterflow indicators or pressure switches.



Vane type indicators



Waterflow switch

Supervisory Devices

The water supply for a sprinkler system is controlled by a shut off valve. Once a sprinkler valve is closed the sprinkler system will not operate correctly. The three main type of valves used for a sprinkler system are called Outside Screw and Yoke (OS&Y), Butterfly and Post Indicator Valve (PIV).

According to section 903.4 of the 2008 Building Code all valves controlling the water supply for automatic sprinkler systems, pumps, tanks, on all sprinkler systems shall be electrically supervised by the fire alarm system.

Once a supervisory signal is received the central station shall immediately notify the designated representative for the premise.

The ability to shutoff parts of a building allows the Fire Department to have greater control over the sprinkler system. When a fire is under control in an area the valve can be closed to prevent any further water damage.



O S &Y Valve



PIV Valve



Butterfly Valve

2.6 Audible and Visual Notification Appliances

Notification appliances are used to alert persons of the need to take action, usually to evacuate. The appliances include bells, horns, speakers, strobes, text displays or a combination of these devices. The audible and/or visual notification alert the occupants of a fire or other emergency condition requiring action.



Speaker



Speaker strobe



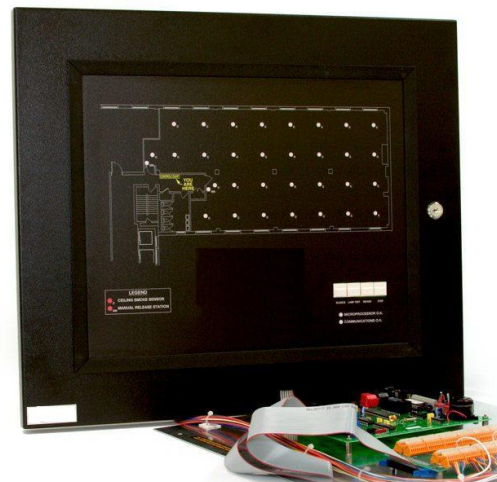
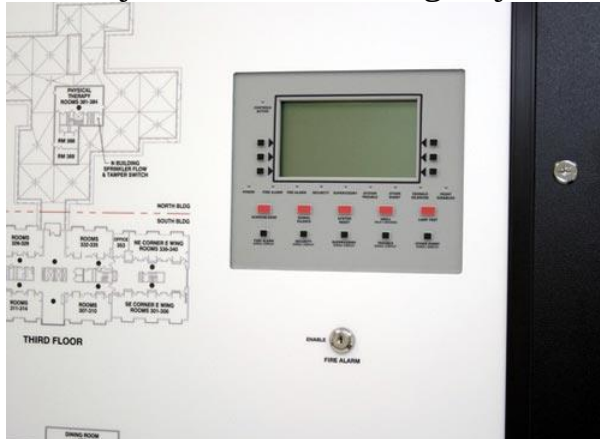
Horn Strobe



Strobe

2.7 Remote On-Site Annunciator Panel

In many buildings, a remote alarm annunciator panel is located where it is accessible to fire-fighting crews. The annunciator panel will indicate the zone and/or the location of the fire alarm device that has activated. In a large building such as an office tower or hotel, the fire annunciator may also be associated with a smoke purge control panel for building ventilation systems, and may also include emergency communication systems for the building.



Examples of Annunciator Panel

2.8 Power Supply

All fire alarm systems that are connected to a central station must have 24 hours of battery standby power. In addition, the fire alarm system shall have a secondary power supply which provides power to the alarm system within 10 seconds of failure of the primary power supply. Storage batteries dedicated to

the fire alarm system or engine driven generators are acceptable as secondary power source for the system.

2.9 Signaling Systems

Fire alarm systems are classified according to the type of functions they perform. The installation and use of some of the more common systems is described below:

A. Central Station Signaling Systems.

Central station systems are operated by employees of a firm whose principal business is to furnish and maintain supervised signaling service. The central station serves several businesses or properties that subscribe to the service. The service providing fire protection often provides other services as well, e.g., burglar alarm service.

B. Proprietary Signaling Systems.

This kind of system can serve several properties under one ownership. The property owner owns the alarm system. Alarm, trouble and supervisory signals are transmitted to a central supervising station. The station is usually located on the same premises as the alarm system. The station must be attended 24 hours a day by a Certificate of Fitness holder. This type of signaling system is commonly used at large premises.

2.10 Notification of Fire Alarms within a Building

There are three methods used to notify the occupants of a building in case of a fire: general alarm, selective alarm, and pre-signal alarm methods.

(1) **General alarm method** activates all signaling devices throughout the building when a fire is discovered. (2) **Selective alarm method** activates the signaling devices only in areas close to the fire. (3) **Pre-signal system method** sends a signal to a control panel or a manned station.

If central station receives supervisory signals indicating a waterflow condition, it shall dispatch as a fire alarm. When the signal is detected the cause of the alarm must be investigated. After the fire alarm system has been activated it must be reset manually at the control panel. **The FACP shall only be reset at the direction of a Fire Department representative.**

2.11 Building Classes

All alarm signals transmitted to the Fire Department Communications Office shall indicate the type of alarm received (e.g., automatic, valve, manual, carbon monoxide, class E/B, class J/R).

The occupancy of the building and the type of system that is installed defines the type of signals that are re-transmitted to the Fire Department Communications Office.

This information is used by the Fire Department to make sure that the correct equipment and personnel are sent to a particular location.

Buildings that were considered to be high rises and required voice communication systems fell under two main categories called Class-J and Class-E in the 1968 Building Code.

Occupancy group J/R shall include buildings and spaces that are primarily occupied for the shelter and sleeping accommodation of individuals on a day-to-day or week-to-week basis.

Occupancy Group E/B buildings and spaces shall be classified in the business occupancy group when they are occupied for transacting business; for rendering professional services; or for performing other commercial services that may incidentally involve the storage of limited quantities of stocks of goods for office use or purposes. Buildings and spaces used for prosecuting public or civic services shall also be classified in this group.

The 2008 Building Code requires a voice communication system for most buildings that meet the definition of a high rise building including Class-B and Class-R.

3. CENTRAL STATIONS OPERATION

A central station company shall be responsible for the maintenance of its central stations and the transmitters at protected premises within New York City monitored by such central stations. An S-97/S-98/T-97 Certificate of Fitness is required to install, maintain, test or repair fire alarm system.

A central station company shall have sufficient personnel on duty at all times to ensure immediate attention to all signals received. This shall **include a minimum of 2 F-40 certified operators** at all times. The Certificate of Fitness holder's immediate responsibility is to monitor and retransmit the system signals and must not be tasked with any other responsibility at the same time.

The responsibilities of the Central Station Operator as related to the fire alarms are:

- (1) to retransmit the signals to the Fire Department
- (2) to communicate with the person designated by the subscriber
- (3) to document all activities & keep records

3.1 Fire Alarm Signal Dispatch Procedures

The F-40 Certificate of Fitness holder must notify the Fire Department immediately when an alarm signal is detected. This must be accomplished by providing a **class "3" Alarm Box and Terminal Number** to the Fire Department Communication Office. The designated representative of the building must also be notified. **The Certificate of Fitness holder should never assume that any alarm is "only" a false alarm.**

Only Certificate of Fitness holders are authorized to receive and retransmit fire alarms at a Central Station. There are very important standard operating procedures for central station companies to transmit class "3" alarms to any FDNY Communication Office. **The transmission of a fire alarm is required to be performed in less than 90 seconds.** A central station signaling system shall receive and retransmit all signals and information which the subscriber is required by law to transmit, such as the location of the alarm source (building, floor, section, zone, or subdivision) and/or the type of alarm signal (e.g., automatic, valve or manual).

Subsequent alarm signals received from the same building shall be immediately retransmitted to the Fire Department. A combination alarm signal that indicates a waterflow in a sprinkler system at the protected premises shall be retransmitted in the same manner as a fire alarm signal. In addition, the designated representative for the protected premises shall be notified as soon as possible.

If a combination alarm is received that indicates a waterflow at the protected premises, the signal should be treated as an alarm signal. For example, a low air signal from a pressure tank followed by a low water signal from a gravity tank should be handled as a fire alarm signal. The FDNY Communication Office should be notified immediately. A combination alarm occurs whenever two or more associated supervisory signals occur in close succession. For example, low water level supervisory signals received in close succession from two or more gravity tanks would be treated as a waterflow alarm. Alarm signals from manual fire alarm boxes, automatic fire detectors, waterflow detectors are treated as fire alarms. Fire alarm signals must be transmitted to the Fire Department Communication Offices immediately upon receipt of a signal at the Central Station. Signals are deemed to be received at the time they are capable of being decoded.

The chart shown on the following page establishes the guidelines to be followed by FDNY Fire Alarm Dispatchers when requesting or receiving information.

This chart must be posted at all dispatching stations for use by F-40 operations. Additionally, the central station must be equipped with two separate paths of communication with the Fire Department. Radios and telephones are the most widely used paths of communication. **All** communications must be automatically recorded. The transmission of all alarm signals must be recorded automatically at the central station, as well.



FIRE DEPARTMENT – CITY OF NEW YORK

STANDARD OPERATING PROTOCOL FOR APPROVED CENTRAL STATION TO
RETRANSMIT CLASS 3 FIRE ALARM SIGNALS TO FDNY BOROUGH
COMMUNICATION OFFICES

FDNY BOROUGH COMMUNICATIONS REQUEST
THE FOLLOWING INFORMATION:

1. Borough Information of the Premises.

depending upon the borough in which the property is located: Bronx, Brooklyn, Manhattan, Queens, or Staten Island.

2. Active Fire Box and Terminal Number/Assignment(s)

If the assignment is NOT available, then the fire alarm signal is designated as “unassigned”.

3. The Address of the Premises and the Name of the Location

This shall Include multiple addresses, AKA addresses and cross streets or what Street or Avenues is that address between

4. The Types of FDNY Class 3 Fire Alarms:

Manual, Automatic, Valve, Carbon Monoxide, Class E/B, or Class J/R

5. Specific Detailed Information Regarding Location(s) the Fire Alarm Covers:

North, South, East, West, Floor(s), Section(s), Zone(s), etc.

6. Specific Premises Occupancy Type:

Warehouse, School, Office, etc.

7. The Central Station Company Name and FDNY I.D. Number

8. The Central Station Dispatcher’s I.D. Number

9. The Call Back Number

If the call does not originate from a dedicated primary-secondary telephone line, FDNY borough communication will request a call back telephone number (including Area Code).

3.2 Supervisory or Trouble Signal Dispatch Procedures

3.2.1 Supervisory Signal Dispatch Procedures

Upon receipt of a supervisory signal from a sprinkler system, fire suppression system, or other equipment, a central station shall communicate immediately with the designated representative(s) of the protected premises. Handling of supervisory signals should take a maximum of four minutes from receipt of a supervisory signal by the central station until initiation of the investigation by telephone.

3.2.2 Trouble Signal Dispatch Procedures

Upon receipt of trouble signals pertaining solely to equipment maintenance of an alarm system, the central station shall communicate immediately with the designated representative(s). Routine handling should take a maximum of four minutes from receipt of a trouble/supervisory signal by the central station until initiation of the investigation by telephone.

A Central Station will occasionally experience unusual circumstances resulting in an inordinate amount of trouble signals received simultaneously such as a power failure encompassing a large area. If a trouble signal is received, which indicates that the transmitter requires maintenance, the maximum time allowed for the technician to arrive is 4 hours.

3.2.3 Phone Line Signals

When using an approved internet/cellular transmitter the maximum time allowed for the central station to receive a communication failure is within 5 minutes. According to the NFPA 6.15.2.2 if a central station receives a primary phone line failure from a building using a DACT, the operator is required to immediately notify the designated representative.

3.3 Carbon Monoxide (CO) Alarm Signal Dispatch Procedures

Unless otherwise required by the emergency response agency, upon receipt at the central station of a CO alarm signal, with or without a restoral signal, the central station shall:

A) Dispatch the FDNY to the location:

Inform the fire department that a carbon monoxide alarm was received.

B) Call the premise number:

Notify the responding person that a CO alarm was received from the premises and the Fire Department has been dispatched. (A verbal passcode is not

necessary in order to relay this information, but the operator shall request the name of the responding person.)

The occupants shall be instructed to leave the premises and move to fresh air.

The central station shall ask the following questions of the individual answering the telephone:

- 1) Are all the occupants accounted for and are they out of the premises?
- 2) Is anyone dizzy, nauseous, ill, or have a headache?

The central station shall instruct the occupants not to re-enter the premises until cleared by the FDNY.

If the responding person informs the central that not all persons have been accounted for or there are people that are feeling ill, the central shall call the fire department back and provide this information.

If the central is unable to reach someone at the premises it shall call the Fire Department back and provide this information.

If an answering machine or voicemail is encountered:

The central shall leave a message including the date, time and alarm event and instruct all occupants to evacuate the building.

C) Notify persons from the emergency contact list:

Notify the responding person that a CO alarm was received from the premises and the FDNY has been dispatched. (A verbal pass-code is not necessary in order to relay this information)

The responding person shall be instructed to not enter the premises until cleared by the FDNY.

3.4 Recordkeeping

All records required to be maintained by the FDNY shall be entered in a central station log which shall be maintained at each central station. The central station log shall be available at all times to the Fire Department for inspection, and copies shall be provided upon the Department's request. **The central station log shall be kept on a yearly basis and be maintained for 6 years following the period of use.** The dates and times of the receipt and retransmission of all signals shall be recorded in the central station log.

The format of the central station log shall be either:

- (1) a computer database with a legend or key to all symbols and abbreviations
- (2) a bound (not spiral bound) logbook for each calendar year, with consecutively numbered lined pages with entries made in ink;
- (3) any other format approved by the Commissioner.

Where a computer format is used, the data may be stored on tape, disk or hard copy, provided that hard copies are maintained for **18 months** following the period of use, in addition to the storage of the tape or disk for **6 years following the period of use.**

4. SERVICE DISRUPTIONS & RESTORING FIRE ALARM SYSTEMS

4.1 Notification

It is imperative that disruptions in central station service be detected as soon as possible and that service be restored immediately. The Fire Department shall be notified of any disruption of fire alarm monitoring services regardless whether the disruption is because of failure of a fire alarm system, a fire suppression system, a protective signaling system, or central station equipment. Central station operator must notify FDNY Borough communications office if there will be a disruption of service at the premises.

A central station is required to be notified including but not limited to the following situations:

- (1) Any required fire protection system is out of service (unplanned and planned out of service condition)
- (2) Any testing or maintenance of the required fire alarm system
- (3) Any testing or maintenance of the sprinkler system

The central station company shall make the following notifications:

- (1) The central station company shall notify the Fire Department whenever a fire alarm system or fire protection system is expected to be out of service for **eight (8) hours or longer** at a protected premises, where such information is available.

The general information (non-emergency) numbers for the 5 boroughs are as follows:

Manhattan	(212) 570-4300
Brooklyn	(718) 965-8300
Queens	(718) 476-6200
Bronx	(718) 430-0200
Staten Island	(718) 494-4296

- (2) The central station company must notify the Fire Department and the designated representative for the protected premises immediately in the event that a central station is either unable either to receive alarm signals from a protected premises or to retransmit signals to the Fire Department because of inoperative central station equipment or telephone circuitry.
- (3) Whenever a change in the type of fire alarm service being provided (e.g., addition of CO, smoke or valve) a TB-60 modification must be submitted to the Bureau of Fire Prevention within seven days. When any supervisory alarm service is terminated, the Bureau of Fire Prevention must notified by a TB-60 submission within seven days.

In making the referenced notifications, the central station company shall identify to the Fire Department the terminal assignment number(s) for the affected premises, where such information is available.

4.2 Record Keeping

A central station company shall record in the central station log the following information relating to disruptions in service:

All instances in which a fire alarm system or fire protection system is out of service for eight (8) hours or more at a protected premises. This record shall **identify the terminal assignment number for the protected premises**, as well as **the date, time and duration of the disruption of service**.